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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,586	07/30/2003	Tomonori Imamura	116629	6181

25944 7590 12/22/2005

OLIFF & BERRIDGE, PLC  
P.O. BOX 19928  
ALEXANDRIA, VA 22320

EXAMINER
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CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/629,586	<b>Applicant(s)</b> IMAMURA ET AL.	
	<b>Examiner</b> Gregg Cantelmo	<b>Art Unit</b> 1745	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☒ Claim(s) 11-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/30/05</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Information Disclosure Statement***

2. The information disclosure statement filed July 30, 2003 has been placed in the application file and the information referred to therein has been considered as to the merits.

***Drawings***

3. The drawings received July 30, 2003 are acceptable for examination purposes.

***Claim Objections***

4. Claims 11-15 are objected to because of the following informalities: the terms "Vesh", "Vesl", "Vtmin", "Vtmax", etc. recited in the claims should be placed in parentheses. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 8-10 recite the limitation "said non-vibrating component" and "said vibrating component". There is insufficient antecedent basis for this limitation in the

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claim. Claims 8-10 are dependent upon claims 1 and 6, neither of which recite this limitation. It is suggested that the dependency of claims 8-10 be amended to become dependent upon claim 7 which would provide sufficient antecedent basis for these limitations.

***Statement - 35 USC § 112 - 6<sup>th</sup> Paragraph***

6. The claim limitations appear to meet the 3-prong analysis and is being treated under 35 U.S.C. 112, sixth paragraph.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Application Publication No. 2002/0009623 (St-Pierre).

St-Pierre discloses a fuel cell and a fuel cell control system comprising: measuring the output voltages of the fuel cell stack (Fig. 4) and diagnosing the moisture level in the electrolyte membrane relative to the voltage measured (Fig. 3 and paragraphs [0075], [0079] and [0080] as applied to claim 1).

The output voltages are traced in time (Fig. 4 as applied to claim 6).

8. Claims 1, 2, 4, 6, 7, 9 and 11-15 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2002-164065 (JP '065).

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JP '065 discloses a fuel cell and a fuel cell control system comprising: measuring the output voltages of the fuel cell stack and diagnosing the humidity level in the electrolyte membrane relative to the voltage measured (Prior art claims as applied to claim 1).

The statistics include average and standard deviation of the voltage (as applied to claim 2).

The moisture level of the electrolyte is monitored as discussed above (as applied to claims 4 and 9).

The output voltages are traced in time (Figs. 4 and 5 as applied to claim 6).

In calculating the average, standard deviation, maximum and minimum voltages for the cells, the results provide both a non-vibrating component represented by the average voltage and a vibrating component from the standard deviation and/or the maximum and minimum voltages (as applied to claim 7).

The fuel cell further includes thermometry means for measuring the temperatures of the fuel cells. The system monitors both voltage characteristics and temperature characteristics, all of which are provided to a processor for storage and diagnosis. The means of JP '065 is held to be structurally capable of performing the same functional diagnosing steps as recite in claims 11-15.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art

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structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

9. Claims 1, 2, 5, 6, 7 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Application Publication No. 2002/0091475 (Hashimoto).

Hashimoto discloses a fuel cell and a fuel cell control system comprising: measuring the output voltages of the fuel cell stack (Fig. 1) and diagnosing the fuel cell operational parameters relative to the voltage measured (paragraph [0084] as applied to claim 1).

The statistics include average and standard deviation of the voltage (paragraph [0084] as applied to claim 2).

The diagnosis means of Hashimoto is a voltage ECU which measures and calculates the average voltage, standard deviation voltages, and max and min voltages

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for the cells and sends the results to the main ECU (paragraph [0084]). The voltage ECU then sends the results to the cooperative ECU 121 which diagnoses the results and adjusts the reactive gas supply (as applied to claim 5).

The output voltages are traced in time (as applied to claim 6).

In calculating the average, standard deviation, maximum and minimum voltages for the cells, the results provide both a non-vibrating component represented by the average voltage and a vibrating component from the standard deviation and/or the maximum and minimum voltages (paragraph [0084] as applied to claim 7).

As discussed above, the system measures the output voltage of the cells and when the voltage is an abnormal voltage, adjusts the hydrogen gas supply to the fuel electrode (as applied to claim 10).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto in view of JP 2002-164069 (JP '069).

The teachings of Hashimoto have been discussed above and are incorporated herein.

The difference between claim 3 and Hashimoto that Hashimoto does not teach of diagnosing that the hydrogen or fuel electrode is blocked by water due to the presence of a voltage measured outside of the prescribed range.

JP '065 discloses a method of monitoring the voltage and diagnosing the state of humidification in the fuel cells in response to abnormalities in the voltage (abstract and claims).

The motivation for using the diagnosing process of is that it would have improved the gas permeance of the fuel electrode and improved the voltage output of the fuel cell.



Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hashimoto by further providing diagnosing that the hydrogen or fuel electrode is blocked by water due to the presence of a voltage measured outside of the prescribed range since it would have provided a corrective measure to improve the gas permeability of the fuel electrode and thus improved the voltage output of the fuel cell.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto in view of JP 2002-164069 (JP '069).

The teachings of Hashimoto have been discussed above and are incorporated herein.

The difference between claim 4 and Hashimoto is that Hashimoto does not teach of diagnosing if the electrolyte has dried if the voltage measured is not within a prescribed range.

According to JP '069 a control device 11 for controlling the fuel cell system estimates the wet condition of the electrolyte film on the basis of, for example, a voltage- current characteristic during operation of a fuel cell; if the wet condition is estimated to be insufficient, cooling water temperature is lowered to lower the operating temperature of the fuel cell so as to raise relative humidity inside a stack and thus accelerate the wetting of the electrolyte film.

The motivation for diagnosing if the electrolyte has dried if the voltage is not within a prescribed range is that it would have provided improved water management of the fuel cell electrolyte and improved the voltage produced by the fuel cell stack.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hashimoto by configuring the ECU and fuel cell system to monitor the voltage characteristic and diagnose the wet condition of the electrolyte film to prevent drying of the electrolyte film and maintain the film at the desired level of humidification to provide improved cell performance.

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto in view of JP '069.

The teachings of Hashimoto have been discussed above and are incorporated herein.

The difference between claim 8 and Hashimoto is that Hashimoto does not teach of diagnosing that water supply is excessive when the non-vibrating component of the voltage statistics decreases.

A decrease in the non-vibrating component is directly indicative of a decrease in the average voltage of the stack.

JP '069 discloses a method of monitoring the voltage and diagnosing the state of humidification in the fuel cells in response to abnormalities in the voltage (abstract and claims).

The motivation for using the diagnosing process of JP '069 is that it would have improved the gas permeance of the fuel electrode and improved the voltage output of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hashimoto by further

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providing diagnosing that the hydrogen or fuel electrode is blocked by water due to the presence of a voltage measured outside of the prescribed range since it would have provided a corrective measure to improve the gas permeability of the fuel electrode and thus improved the voltage output of the fuel cell.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto in view of JP '069.

The teachings of Hashimoto have been discussed above and are incorporated herein.

The difference between claim 9 and Hashimoto that Hashimoto does not teach of diagnosing that electrolyte film becomes dried when the non-vibrating component of the voltage statistics decreases.

A decrease in the non-vibrating component is directly indicative of a decrease in the average voltage of the stack.

JP '069 discloses a method of monitoring the voltage and diagnosing the state of humidification in the fuel cells in response to abnormalities in the voltage (abstract and claims).

The motivation for using the diagnosing process of is that it would have improved the gas permeance of the fuel electrode and improved the voltage output of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hashimoto by further providing diagnosing that the hydrogen or fuel electrode is blocked by water due to the

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presence of a voltage measured outside of the prescribed range since it would have provided a corrective measure to improve the gas permeability of the fuel electrode and thus improved the voltage output of the fuel cell.

14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto in view of ""JP '069.

The teachings of Hashimoto have been discussed above and are incorporated herein.

The difference between claim 10 and Hashimoto that Hashimoto does not teach of diagnosing that the hydrogen supply is insufficient when the non-vibrating component of the voltage statistics decreases.

A decrease in the non-vibrating component is directly indicative of a decrease in the average voltage of the stack.

According to JP '069 a control device 11 for controlling the fuel cell system estimates the wet condition of the electrolyte film on the basis of, for example, a voltage- current characteristic during operation of a fuel cell; if the wet condition is estimated to be insufficient, cooling water temperature is lowered to lower the operating temperature of the fuel cell so as to raise relative humidity inside a stack and thus accelerate the wetting of the electrolyte film.

The motivation for diagnosing if the electrolyte has dried if the voltage is not within a prescribed range is that it would have provided improved water management of the fuel cell electrolyte and improved the voltage produced by the fuel cell stack.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hashimoto by configuring the ECU and fuel cell system to monitor the voltage characteristic and diagnose the wet condition of the electrolyte film to prevent drying of the electrolyte film and maintain the film at the desired level of humidification, maintained the voltage within the prescribed range and provided improved cell performance.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPAT No. 4,756,718 (Ueno) discloses monitoring the voltage of a cell stack and diagnosing cell conditions based on the voltage. USPAT No. 6,815,107 (Inai) discloses monitoring the voltage of a cell stack and diagnosing cell conditions based on the voltage. Yoshiba, et al. "Numerical analysis of molten carbonate fuel cell stack performance: diagnosis of internal conditions using voltage profiles" discloses monitoring the voltage of the stack and diagnosing the internal resistance of and gas supply to the stack based on the measured voltages. Bender, et al. "Further refinements in the segmented cell approach to diagnosing performance in polymer electrolyte fuel cells" discloses monitoring the power output of the stack and diagnosing the degree of humidification in the stack based on the measured voltages.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (571) 272-1283. The examiner can normally be reached on Monday to Thursday from 9 a.m. to 6 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

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supervisor, Pat Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

FAXES received after 4 p.m. will not be processed until the following business day.

Information regarding the status of an application may be obtained from the Patent

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have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free).

Gregg Cantelmo  
Primary Examiner  
Art Unit 1745

gc

A handwritten signature in black ink, appearing to read "Gregg Cantelmo", with a stylized flourish at the end.

December 17, 2005